



STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
WATER RESOURCE ALLOCATION PROGRAM
WATER RIGHTS DIVISION
DISTRICT IV, LAS CRUCES

LOWER RIO GRANDE WATER MASTER
ANNUAL REPORT
2016 ACCOUNTING YEAR



(Left): OSE file photo of a pumping irrigation well 2016.



(Right): OSE file photo of the flume on Palomas ditch 2016.

RYAN J. SERRANO
LOWER RIO GRANDE WATER MASTER, SUPERVISOR
1680 HICKORY LOOP
LAS CRUCES, NM 88005

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INTRODUCTION

On December 3, 2004 the Lower Rio Grande (LRG) Water Master District was established by Order of the State Engineer (SE). The District encompasses a geographic area of 4,224 square miles. The district stretches from the northern extent at the base of Elephant Butte Reservoir in Sierra County, to the southern extent at the New Mexico/Texas/Mexico border in southern Dona Ana County. (See Figure 1)

The District includes the Lower Rio Grande Administrative basin, the Hot Springs Administrative Basin, and the Las Animas Administrative Basin. There are several water users within the District. To name a few: the City of Las Cruces, City of Truth or Consequences, members of the Elephant Butte Irrigation District (EBID), New Mexico State University, New Mexico Spaceport Authority, NASA – Lyndon B. Johnson White Sands Test Facility, Public Utilities of New Mexico, & Union Pacific Intermodal Rail Yard. Additionally, the LRG Water Master District is home to one of the state’s largest agricultural producing regions. The average size of a farm within the district is 302 acres; and the district consistently ranks in the top three statewide for market value of crops and production by unit weight. Examples include Pecans (State Rank 1 - 54,100,000 lbs produces), Alfalfa Hay (State Rank 1 - 130,000 tons produced), Chile (State Rank 2 - 22,000 tons produced), and Upland Cotton (State Rank 3 – 4,650 bales produced) according to the *New Mexico Department of Agriculture’s 2015 Agricultural Statistics Bulletin*.

BACKGROUND

The surface and groundwaters of the District are administered in accordance with all applicable New Mexico state laws and more specifically in accordance with all SE Order’s, permits, licenses, hydrographic surveys, court adjudications, compacts, and settlement agreements, including the following:

- ❖ New Mexico Statutes Annotated, Chapter 72
- ❖ The Rio Grande Compact
- ❖ The Lower Rio Grande Adjudication (State of New Mexico v. EBID)

- ❖ Lower Rio Grande Adjudication, SS-97-101- Settlement Agreement and Third Judicial District Court Final Order (2011)
- ❖ SE Order Number 168, First Initial Metering Order
- ❖ SE Order Number 169, Creating the LRG Water Master District
- ❖ SE Order Number 172, Amended Metering Order
- ❖ SE Order Number 180, Supplemental Metering Order
- ❖ The Hot Springs Hydrographic Survey (1958)
- ❖ The Las Animas Creek Adjudication, Cause No. 6427

New Mexico state law declares that SE has a statutory responsibility to supervise, measure, appropriate, and distribute the waters of the state (*NMSA 1978, Section 72-1-1*). Additionally, New Mexico state law declares that the SE has the authority to appoint Water Masters whose job is to appropriate, regulate, and control the waters of such water districts, if it is in the best interests of public safety, and the water users of such water districts (*NMSA 1978, Section 72-3-1 & Section 72-3-2*). In accordance with the above referenced statute, the SE appointed a Water Master to the LRG Water Master District who is charged with administering and apportioning the waters of the District, and whose specific duties include; but are not limited to:

- ❖ Curtailing illegal diversions
- ❖ Measuring and reporting water usage within the district
- ❖ Curtailing out-of-priority diversions
- ❖ Administering water usage according to agreements entered into by the water users of the district
- ❖ Coordinate, where indicated, with the United State Bureau of Reclamation (BOR) and the EBID so as to ensure the appropriate regulation and control of groundwater withdrawals.

MAP OF THE LOWER RIO GRANDE WATER MASTER DISTRICT

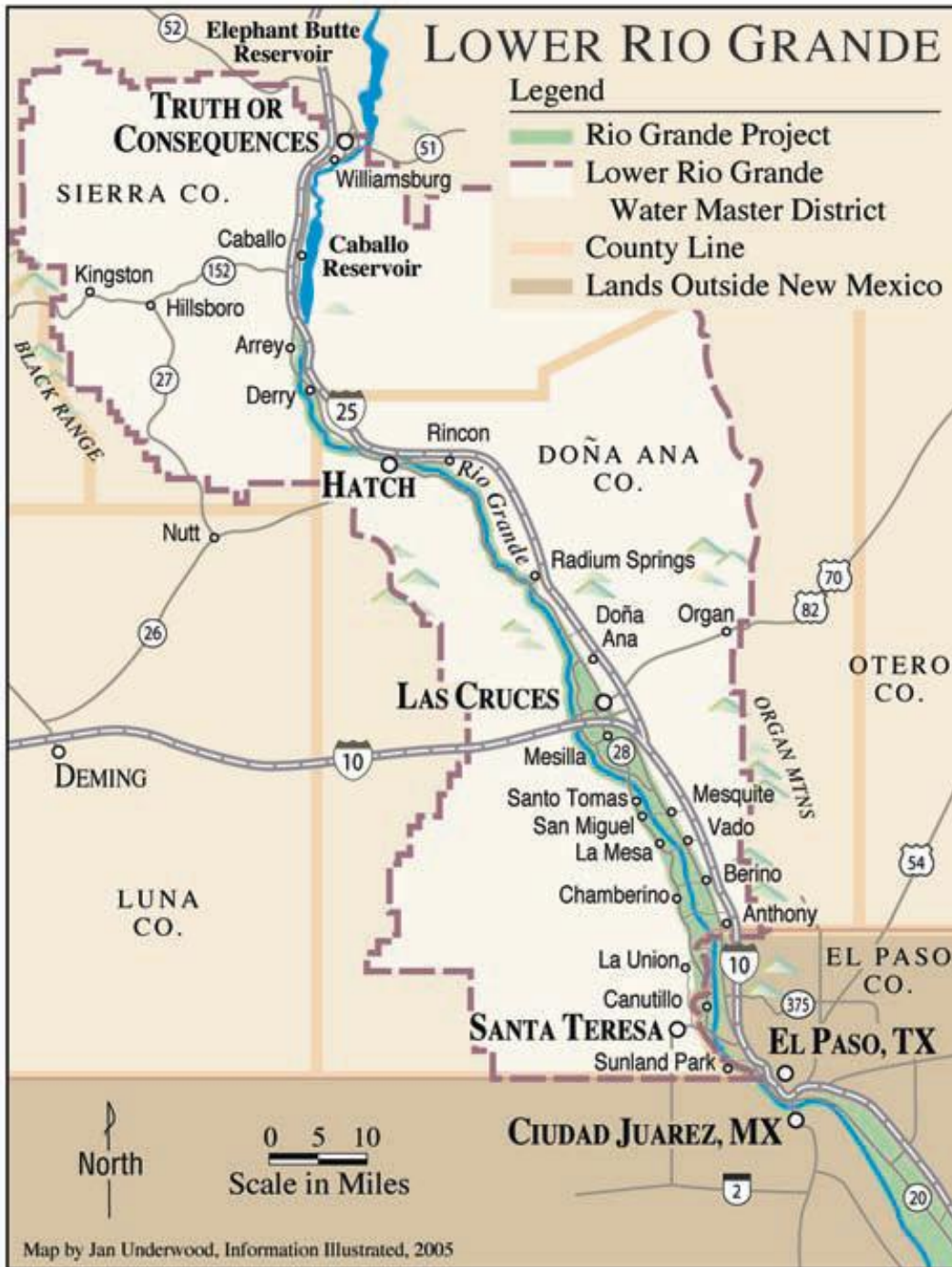


Figure 1.

The LRG Water Master group currently consists of five full time employees who maintain offices at the District IV Las Cruces Office of the State Engineer, at 1680 Hickory Loop, Suite J. Members of the group include LRG Water Master Supervisor Ryan J. Serrano, Senior Assistant LRG Water Master Juan-Carlos Benavides, Senior Assistant LRG Water Master Bernadette Fontenelle, Assistant LRG Water Master Demetrio Alanis, and Assistant LRG Water Master Danny Carrillo. All members of the LRG Water Master group are direct employees of the SE and are compensated from the SE's general fund.

Field work of the Water Master group generally includes inspections of groundwater points of diversion, surface water points of diversions, measurement devices and structures, water right places of use, and any illegal uses or waste of water. Field work also includes the utilization of Trimble GPS technology to acquire well locations and water right place of use locations.

Office work of the Water Master group generally includes preparation of technical reports, memoranda on water rights, and the metered diversions of those rights. The group processes and maintains approximately 14,000 meter records that are submitted to the District IV office annually, tabulates diversion records and determines over diversions, compiles reports, generates compliance notices and general correspondence, provides customer assistance to the general public, coordinates compliance actions with the OSE's Administrative Litigation Unit (ALU), and attends various meetings.

OBJECTIVES

MEETINGS

In 2016, the LRG Water Master Supervisor and his staff participated in several one-on-one meetings with water users both in the office and in the field. Discussions centered on groundwater diversion limits, reconciliation of accounts, settlement provisions, and metering issues. The Water Master Supervisor also participated in occasional meetings with upper management to provide updates and discuss strategy regarding activities within the district. On more than one occasion, the Water Master Supervisor provided local expertise in meetings regarding the development of rules for expedited water marketing within the LRG.

ENFORCEMENT & COMPLIANCE

In 2016, the LRG Water Master group initiated 138 enforcement and compliance actions for varying degrees of non-compliance within the SE jurisdiction as set forth in the onset of this report. Of the 138 enforcement and compliance actions initiated, 84 (61%) have been resolved without further enforcement, and the remaining 54 (39%) actions are still pending. If compliance is not achieved on the remaining 54 actions within a timely fashion, then these issues will be forwarded to the SE's ALU to pursue compliance orders in accordance with *NMSA 1978, Section 72-2-18* and enforcement of those orders in either the Third or Seventh Judicial District Courts.

IMPLEMENTATION OF SETTLEMENT TERMS

In addition to the ongoing enforcement and compliance efforts described above, in 2016, Water Master staff also continued to actively implement the 2011 Settlement of LRG Irrigation Water Requirements and Final Judgment issued by the Third Judicial District Court. This Settlement and Judgment set limits on the amount of groundwater that can be diverted for irrigation purposes within the district. The Farm Delivery Requirement (FDR) was set at 4.5 ac-ft/acre, and the Consumptive Irrigation Requirement (CIR) was set at 2.6 ac-ft/acre. Implementation efforts have focused on accurate accounting of the FDR and accommodation of other specific provisions within the settlement that allow for joint management of groundwater rights associated with "farms under the same management/ownership (OwMan). Joint management gives water users more flexibility in allocating groundwater pumping among farms (that is, one farm can pump more, if another farm pumps less), even if those farms have different water rights file numbers. This provision can be used in managing groundwater on separate farms owned by the same party. This provision can also be utilized by a farmer who manages a number of farms, not all of which he or she owns, provided there is a written agreement between the farmer and the landowners.

Water Master staff have made considerable efforts in the last four accounting years to implement and effectively manage the basin wide FDR and the other applicable provisions of the settlement, including but not limited to the OwMan provision. An example of these efforts included the development

of accounting mechanisms in the New Mexico Water Rights Reporting System (NMWRRS) website for accurate tracking of diversion on a yearly basis. Other efforts included providing notice to water users of their specific allowable diversion based on their individual water rights and whether or not they had exceeded that allowable limit in any one accounting year. In March of 2016, Water Master staff tabulated the diversion amounts associated with each individual water right for the previous 2015 accounting year, taking into consideration all of the variables associated with the diversion of groundwater within the district including water right specific FDR's, surface water allotments, and settlement provisions. From this tabulation, Water Master staff determined that approximately 4,161 acre-ft of groundwater was diverted in excess of the total allowable diversion limit associated with the known water rights on file with this office.

In an effort to reconcile the exceeded amount of groundwater in a timely fashion, the Water Master put into motion a stepped procedure for reconciling these diversions. This procedure was developed in coordination with the SE ALU & the SE Hearing Unit. The procedure includes notices to owners, initiation of compliance orders, and an option for expedited administrative hearings. This effort proved to be extremely effective and resulted in upwards of 91% of the exceeded diversion being successfully reconciled within one year. The details of this effort are summarized in *Figure 2* on Page 8.

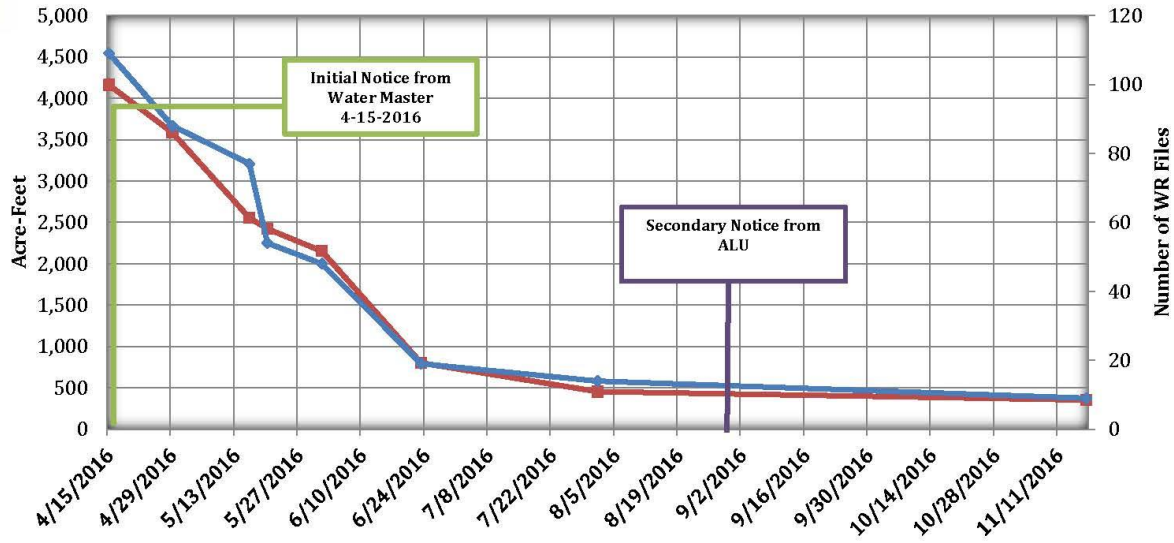
The reconciliation of each exceeded diversion occurred via one of four primary techniques. 1) by identifying and correcting inaccurate acreages in the WATERS database, 2) by verifying and correcting distribution errors (*mostly with a single well that serves multiple water rights*), 3) by grouping farms and associated diversions and averaging the use across several water right files using the OwMan provision of SSI#101, or 4) by paying back. We have instances where water right owners acknowledge their overdiversion and are willing to pay it back by either 1) reducing their overall diversion in 2016, 2) by letting land lay fallow in 2016, or 3) taking land out of production. By far, the use of the OwMan provision is the most commonly used technique for reconciling diversions, and has resulted in over 56,287 irrigated acres within the district being designated as part of an authorized OwMan plan as

recorded in the District IV office water rights files. A map depicting the physical location of these acres is included hereto as *Figure 3* on Page 9.

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Lower Rio Grande Groundwater Reconciliation Progress Accounting Year 2015



	4/15/2016	4/29/2016	5/16/2016	5/20/2016	6/1/2016	6/23/2016	8/1/2016	11/17/2016
Amount of Water (acre-feet)	4,161	3,585	2,554	2,423	2,153	800	454	353
Number of WR Files	109	88	77	54	48	19	14	9

The data depicted in this chart is preliminary and subject to change.
LRG Water Master Supervisor, RJS

Figure 2.

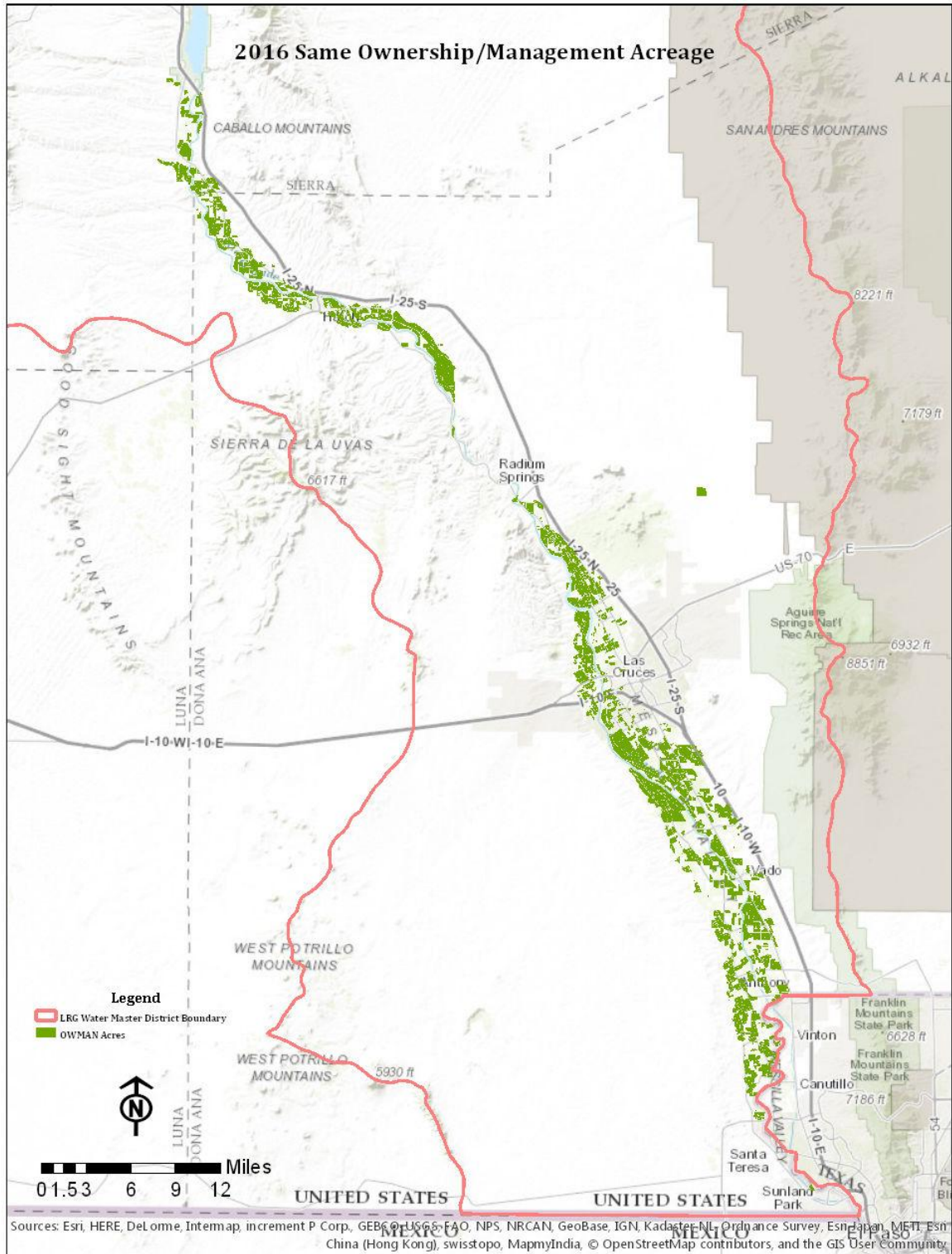


Figure 3.

GROUNDWATER METERING

In accordance with SE Order number 172, it is the responsibility of the water right owners to submit meter readings to the SE on or before the tenth day of January, April, July, and October for the three preceding calendar months, unless otherwise ordered by the SE. In an effort to maintain high voluntary meter reading submittal rates and to ensure a complete and accurate data record, the LRG Water Master group has taken three proactive steps to ensure compliance. Those steps include the following:

STEP 1: Postcard Reminders – In December of each accounting year, LRG Water Master Staff sends a friendly reminder postcard to every water right owner with an actively metered well or diversion. The postcard serves as a general reminder to well owners to submit a final meter reading for the accounting year.

STEP 2: Meter Reading Overdue Letter - In January of the following accounting year, Water Master staff sends out a meter reading delinquency letter to those well owners who failed to submit meter readings for the final reporting period of the year. The letter requires these water right owners to submit their meter reading(s) within 10 days of the receipt of the letter. The letter indicates that if meter readings are not submitted within a timely manner, the issue would be forwarded to the SE's Administrative Litigation Unit.

STEP 3: Outstanding Meter Reading Enforcement – Normally there has been a small percentage of well owners who do not respond to Steps 1 or 2. In order to facilitate a complete data record, Water Master staff conducts field work and physically acquire a meter reading for each of the remaining wells for which a reading has not submitted.

As a result of the LRG Water Master staffs efforts outlined above, **2,811 wells**, or **93.1%** of the actively metered wells within the LRG Water Master District have a meter reading entered into the WATERS databases to close out the accounting year 2016.

SURFACE WATER METERING

In an effort to continually strive to meet our mission goals and objectives as set forth at the onset of this report; the LRG Water Master group oversaw the construction of four new surface water measurement sites within the Water Master district in 2016. The sites selected were identified as



locations in critical need of measurement not only for the purposes of this agency but for the users/managers of these surface water systems and the public at large. The construction of these sites was funded through the State of New Mexico's Severance Tax Bond Program, and the Legislature's Capital Improvement award process. The four sites

constructed in 2016 include a new 10 cubic-foot flume on the Las Palomas Community Ditch in Sierra County (picture to the upper left), a new Electro-Magnetic flow meter on the Lower Las Animas Community Ditch in Sierra County, a new Area-Velocity flow meter on the Holguin Rio Grande Pump in Sierra County (picture to the right), and new Meter adapter on the Paxon-Cates Rio Grande pump in Sierra County. All of these four sites were also equipped with modern data logging and radio telemetry equipment that will transmit measurement data from each site to the office in Las Cruces in real time. This data will be hosted on the OSE's Real Time Measurement Website:



<http://meas.ose.state.nm.us/>.

As a result of these sites not being fully functional until mid to late 2016 we do not have a full record of measurement to report. However, the sites are up and running and we expect to have a full set of data to report in 2017.

ANALYSIS

2016 DIVERSIONS

For 2016, the EBID board of directors allotted 13.0 acre-inches (1.08 acre-ft per acre) of surface water to its constituents. This allocation equates to **97,891** acre-ft of Rio Grande Project surface water being put to beneficial use within the LRG Water Master District; as compared to 11.0 acre-inches (0.91 acre-ft per acre) or 82,482 acre-ft in 2015. This 15% increase in Rio Grande surface water supply from 2015 to 2016 is the result of average to below average snowmelt runoff from the upper watershed and average spring rainfall in south/central New Mexico that was captured in both Elephant Butte reservoir and Caballo reservoir. Consistent with the previous year's observation, this slight increase in Rio Grande surface water supply translated to decreased groundwater pumping being witnessed for irrigation purposes in 2016.

The increased amount of surface water and the timing of its delivery (*April 15th, 2016 to the Hatch/Rincon Valley and May 31th, 2016 to the Mesilla Valley*) had a notable impact on the amount of early season supplemental groundwater pumping that we would have normally observed for early season crops such as onions, lettuce, cabbage, wheat, alfalfa, and silage. This staggered release of surface water to has been deployed over the previous two irrigations seasons. This surface water delivery method has proven to be very effective in alleviating the need for early season supplemental groundwater pumping and allowed many farmers to start and in some instances finish crops without supplemental groundwater particularly in the Hatch/Rincon Valley.

A lack luster monsoon season and record breaking high temperature late in the summer and through the fall led to sustained rates of supplemental groundwater diversions later in the growing season. These groundwater diversions late in the season are necessary to finish late season crops such as cotton, alfalfa and pecans.

In 2016, a total of **264,852 acre-ft** of metered groundwater was diverted within the LRG Water Master District. This is a 0.50% decrease in groundwater diversions compared to the 2015 accounting

year. For irrigation purposes 216,252 acre-ft of groundwater was diverted. This is a 1.5% decrease from 2015. For municipal and other drinking water purposes 39,661 acre-ft was diverted. This is a 12% increase from 2015. *Table 1* on page 14 compares and summarizes groundwater diversion by category for the 2014, 2015, and 2016 accounting years. Additionally, *Figure 4* on page 15 compares irrigation specific diversion totals for the 2014, 2015, and 2016 accounting years.

The Water Master supervisor fielded many requests in 2016 not only for basin wide groundwater diversion data, but also for sub-basin specific diversion data. Seeing the benefit of further analysis at the sub-basin level we have included a further breakdown of sub-basin groundwater diversion hereto. For the purposes of this report sub-basins are defined according to the criteria set for the Lower Rio Grande Basin Hydrographic Survey Report (*Parsons Et. al, 2000*). There are four distinct sub-basins; they are the Rincon Valley Section (RIN), Northern Mesilla Valley Section (NMES), Southern Mesilla Valley Section, and the Outlying Areas Section (OUTLY). *Table 2* on page 16 details this sub-basin breakdown in greater detail.

In the Hot Springs Administrative Basin, a total of 2,378 acre-ft of metered groundwater was diverted under the jurisdiction of the LRG Water Master in 2016, of which 890 acre-ft was diverted for irrigation purposes, and 1,328 acre-ft was diverted for municipal purposes. This municipal use includes the water rights on file with the SE for the City of Truth or Consequences.

In the Las Animas Administrative Basin a total of 211 acre-ft of metered groundwater was diverted under the jurisdiction of the LRG Water Master in 2016, of which 203 acre-ft were diverted for irrigation purposes. Only 7 acre-ft of groundwater was diverted for a use other than irrigation in the Las Animas Basin.

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Three (3) Year Comparison and Summary of Metered Groundwater Diversions in the Lower Rio Grande Water Master District (Acre-Feet)



Category	2014		2015		2016		3-Year Total	
Irrigation	251,978	83%	219,404	83%	216,252	82%	687,634	82%
Drinking Water: Municipal, Mutual Domestic, and individual Domestic Supply <i>(includes 2,400 AF of estimated unmetered domestic)</i>	39,056	13%	34,636	13%	39,661	15%	113,353	14%
City of Las Cruces	19,771		15,166		20,197			
New Mexico State University	2,765		7,218		2,668			
Mutual Domestic	7,664		8,072		7,855			
Other Drinking Water	8,856		4,180		8,941			
Commercial/Industrial/Dairy	7,829	3%	5,957	2%	7,384	3%	21,170	3%
All Other Uses	4,033	1%	5,974	2%	1,555	1%	11,562	1%
Total	302,896		265,971		264,852		833,719	100%

Table 1.

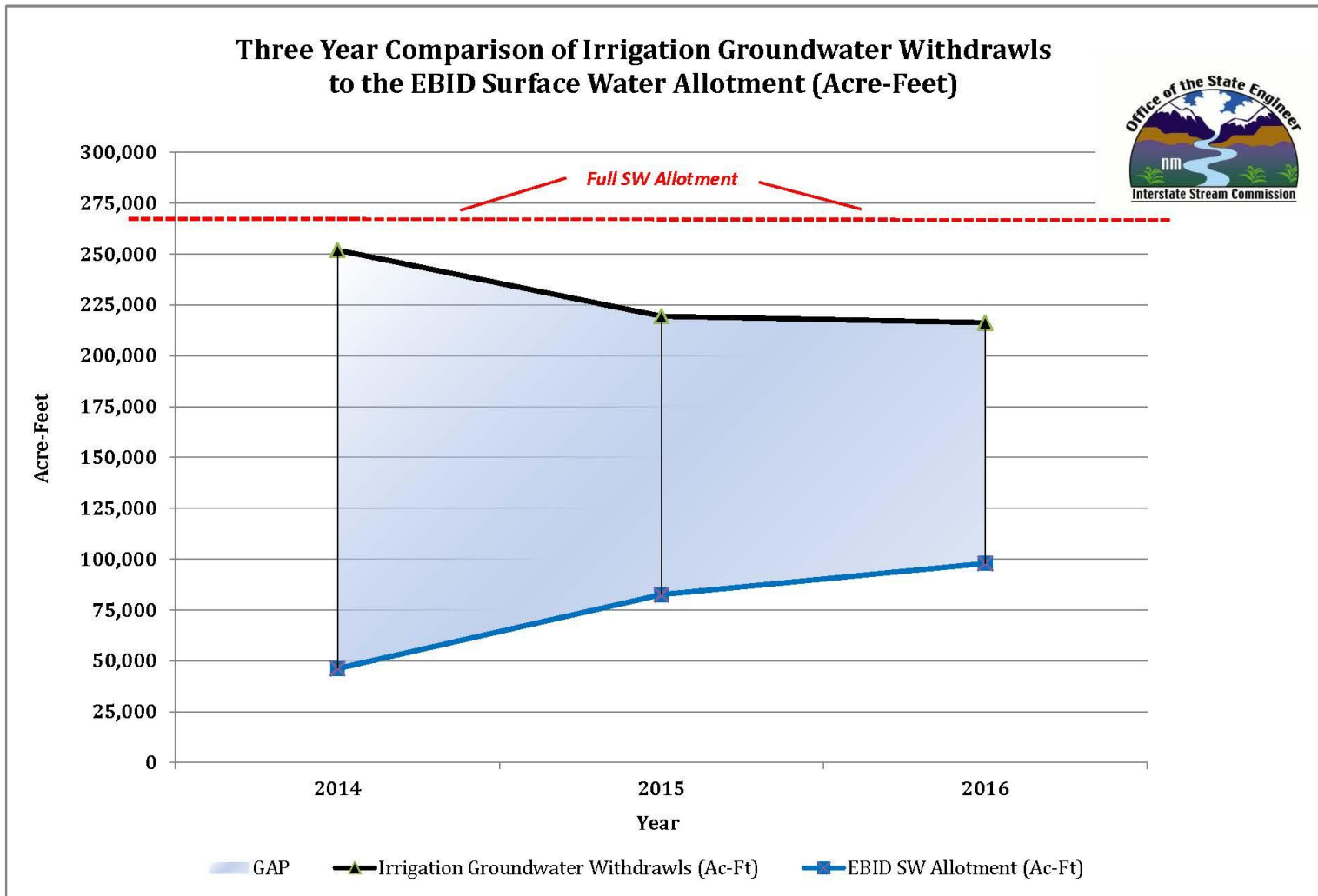


Figure 4.



Lower Rio Grande Sub-Basin Breakdown of Metered Groundwater Diversion (Acre-Feet) - 2016



Category	RINCON		NMES		SMES		OUTLY	
Irrigation	51,142	97.70%	43,944	63.93%	119,657	90.01%	2,079	18.92%
Drinking Water: Municipal, Mutual Domestic, and individual Domestic Supply <i>(includes 2,400 Ac-Ft of estimated unmetered domestic/all four sub-basins)</i>	1,031	1.97%	24,162	35.15%	6,777	5.10%	7,691	70.01%
Commercial/Industrial/Dairy	150	0.29%	541	0.79%	5,990	4.51%	120	1.09%
All Other Uses	23	0.04%	95	0.14%	514	0.39%	1,096	9.98%
Sub-Basin TOTAL(s)	52,346	100.00%	68,742	100.00%	132,938	100.00%	10,985	100.00%

BASIN WIDE AGRREGATE		
	Metered Groundwater	% of Total
RINCON	52,346	19.76%
NMES	68,583	25.89%
SMES	132,938	50.19%
OUTLY	10,985	4.15%
TOTAL	264,852	100.00%

Table 2.

2014 - 2016 GROUNDWATER LEVEL OBSERVATIONS

Groundwater levels within the LRG Water Master district are monitored by a network of shallow groundwater monitoring wells that are drilled into the river valley alluvium and the underlying contiguous Santa Fe group geologic formation. These monitoring wells were drilled as part of a cooperative effort between the New Mexico Interstate Stream Commission (ISC) and the EBID. All of the monitoring wells are drilled in the central portion of the district within the Rio Grande valley alluvial flood plain between the east and west mesas (see map of monitoring well location on page 20).

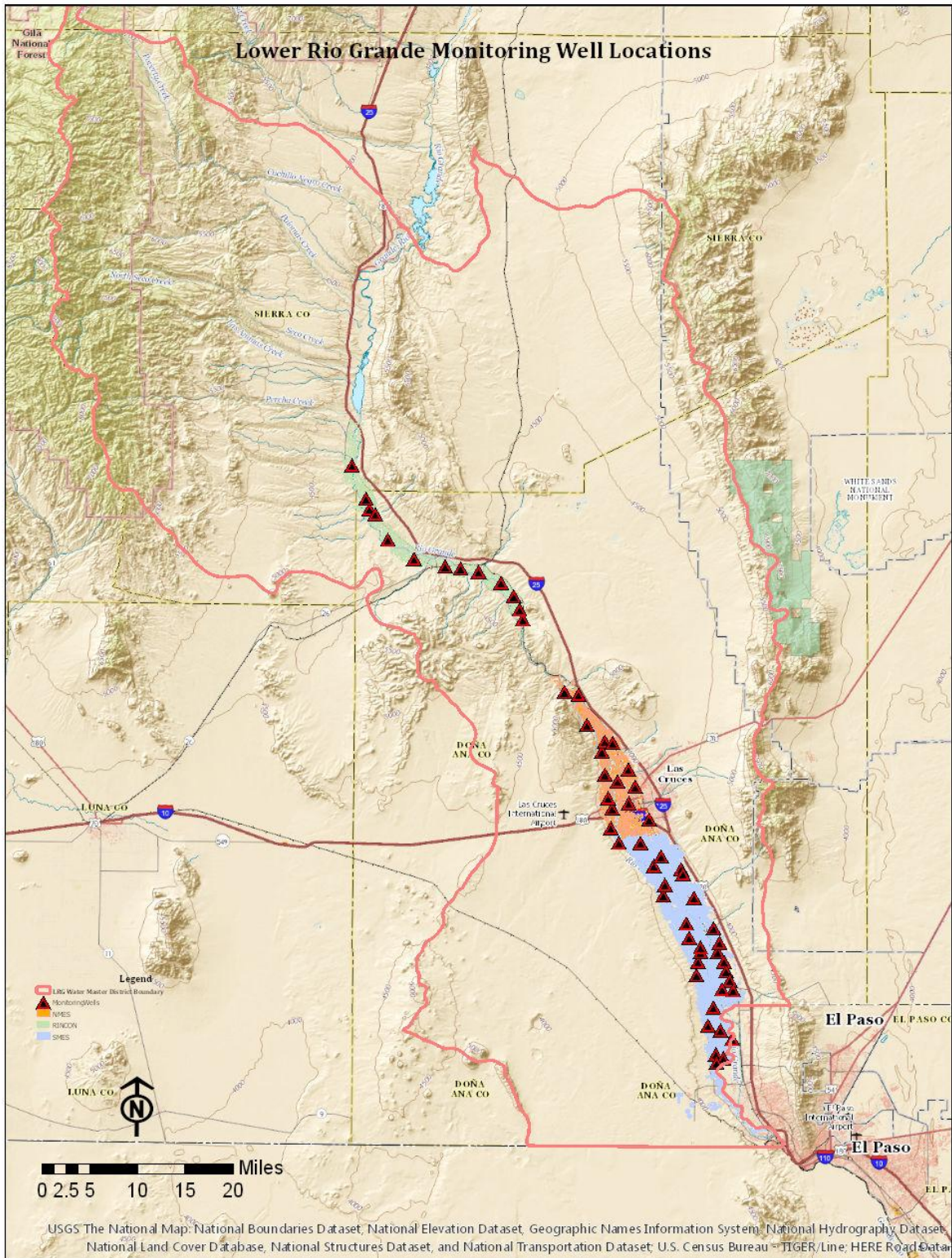
For ease of data interpretation, we separate the monitoring wells into three (3) distinct geographic sub-basins, the Rincon (RIN), the Northern Mesilla (NMES), and the Southern Mesilla (SMES). The data collection at these monitoring wells is maintained by the EBID, and Water Master staff frequently downloads the data from EBID's hosted website (www.ebid-nm.org) to track groundwater level fluctuations throughout the accounting year.

Over the time period of the 2014 - 2016 accounting years (January 2014 - December 2016), groundwater levels in the RIN sub-basin witnessed an average rate of change of **+1.28 feet**, with the most notable variations shown at monitoring locations: RIN_2R, RIN_8R, and RIN_11R. (*RIN Hydrograph, page 16*). In the NMES sub-basin, groundwater levels increased by an average rate of change of **+0.70 feet**, with the most notable variations shown at monitoring locations: MES_15R, MES_26R, and MES_43R. (*NMES Hydrograph, Page 21*). In the SMES sub-basin, groundwater levels decreased by an average rate of change of **-0.72 feet**, with the most notable variations shown at monitoring locations: MES_10R, MES_33R, and MES_48. (*Southern Mesilla Hydrograph page 23*).

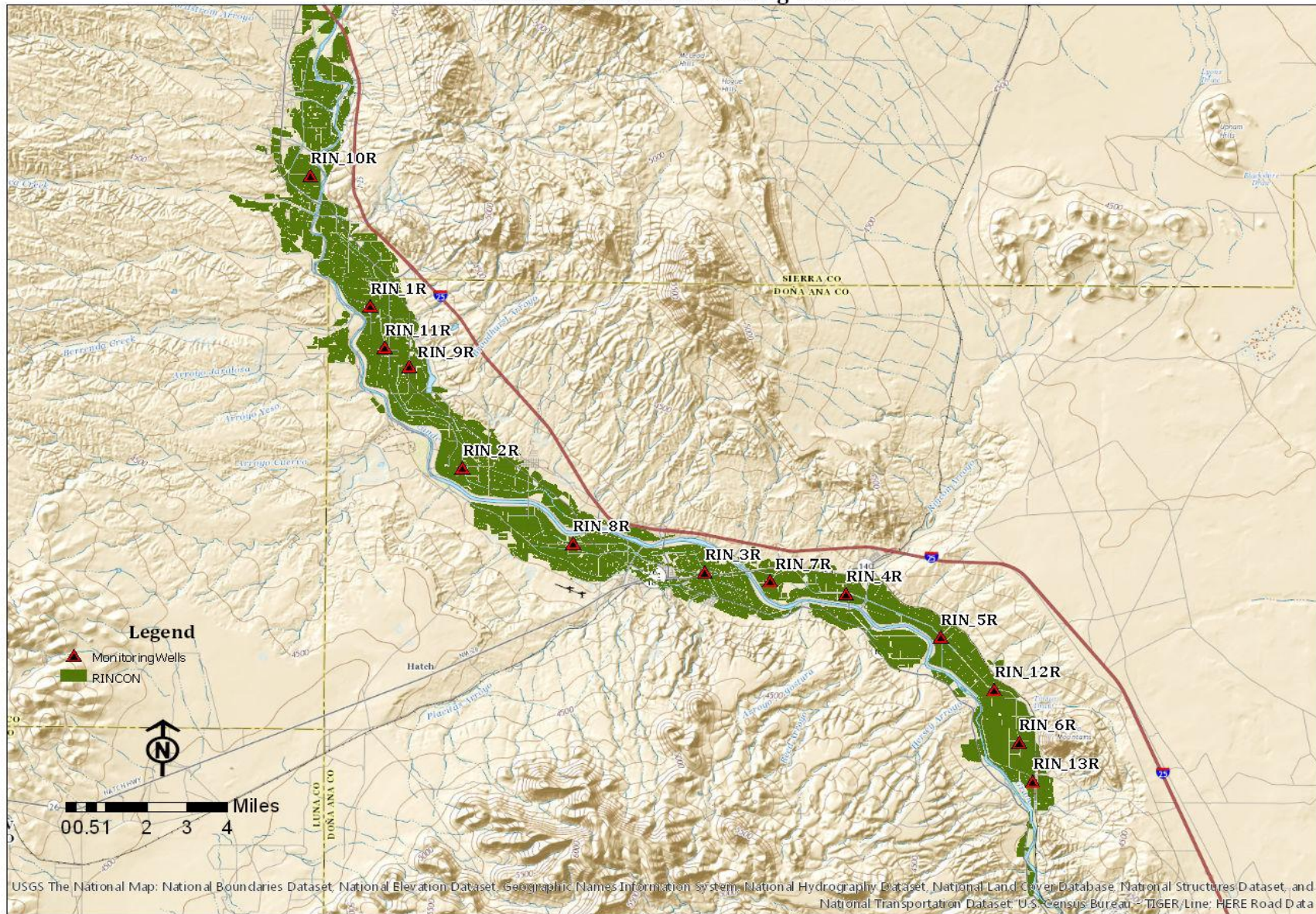
For the purposes of this report, monthly and yearly rates of change per geographic sub-basin were derived using a simple rate of change formula $R = \frac{\Delta X}{\Delta Y}$. Monthly rates of change are based on thirty six months of groundwater level data at each monitoring location. The monthly rate of change per monitoring well location were then aggregated and averaged per geographic sub-basin to establish a weighted sub-basin rate of change in the groundwater table. NOTE: Within each of the three sub-basin

hydrographs, you will notice occasional gaps in some data series. These gaps are the result of instrumentation error and zero values being reported for that particular time period.

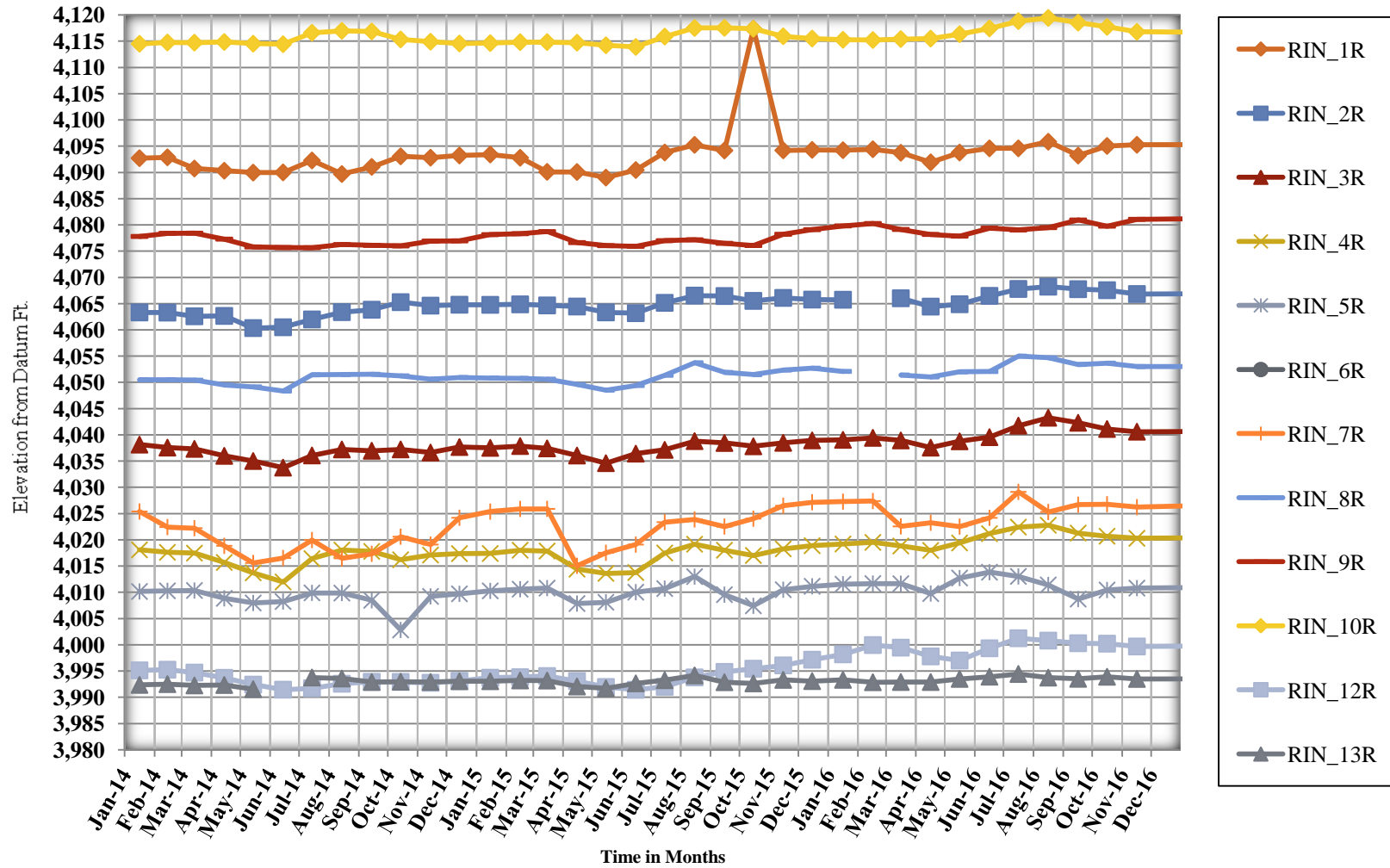
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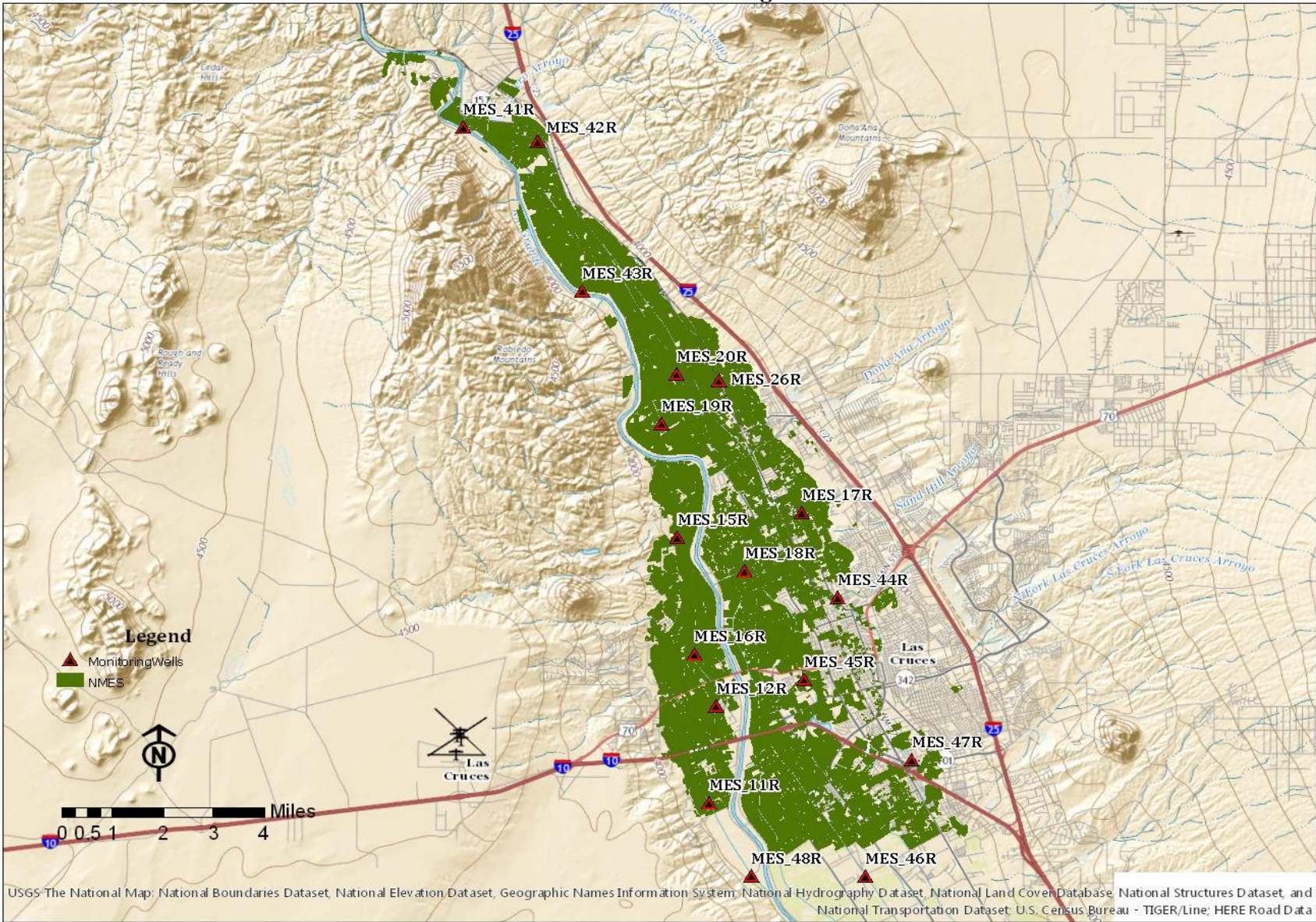
Rincon Sub-Basin Monitoring Wells



Rincon (RIN) Hydrograph

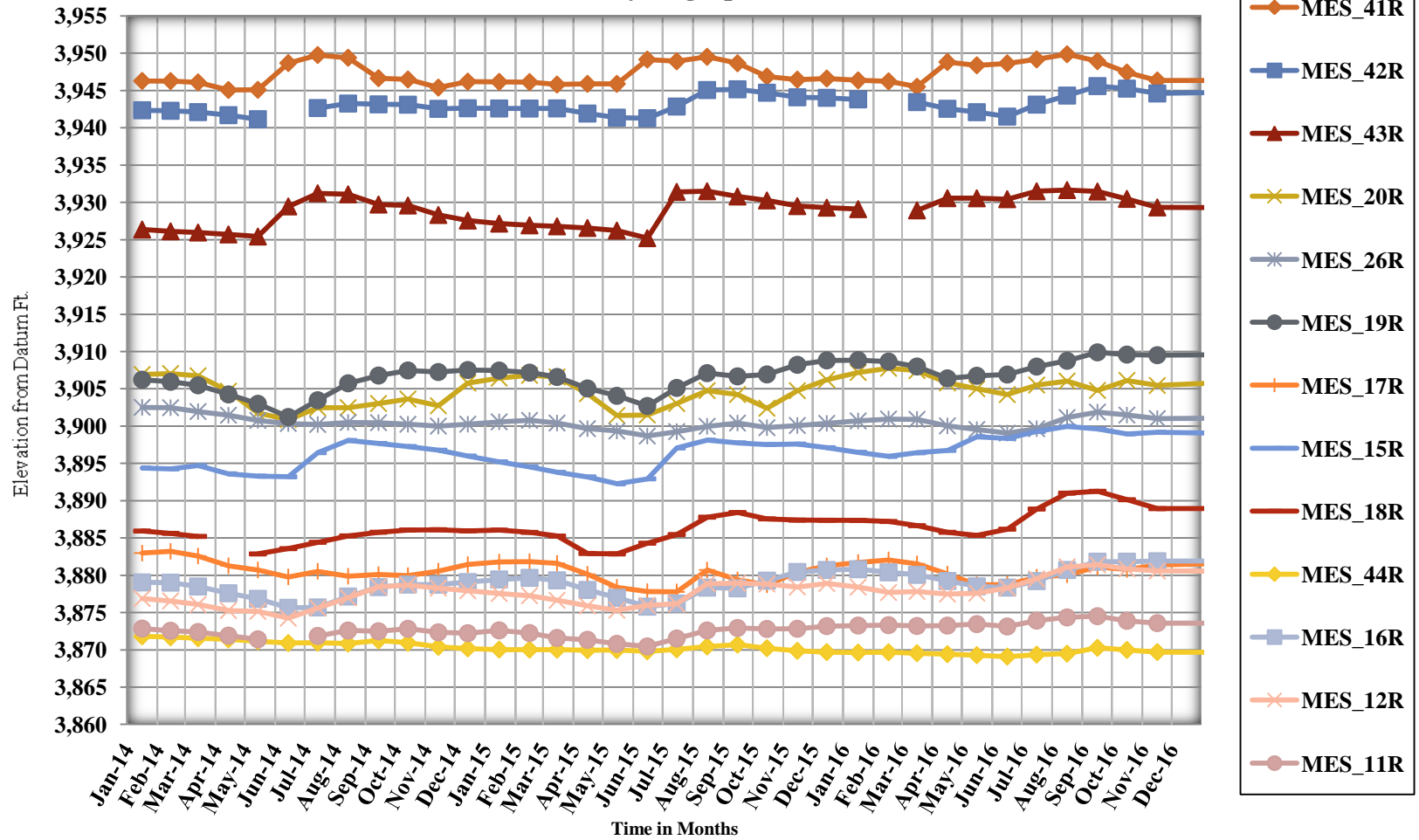


NMES Sub-Basin Monitoring Wells

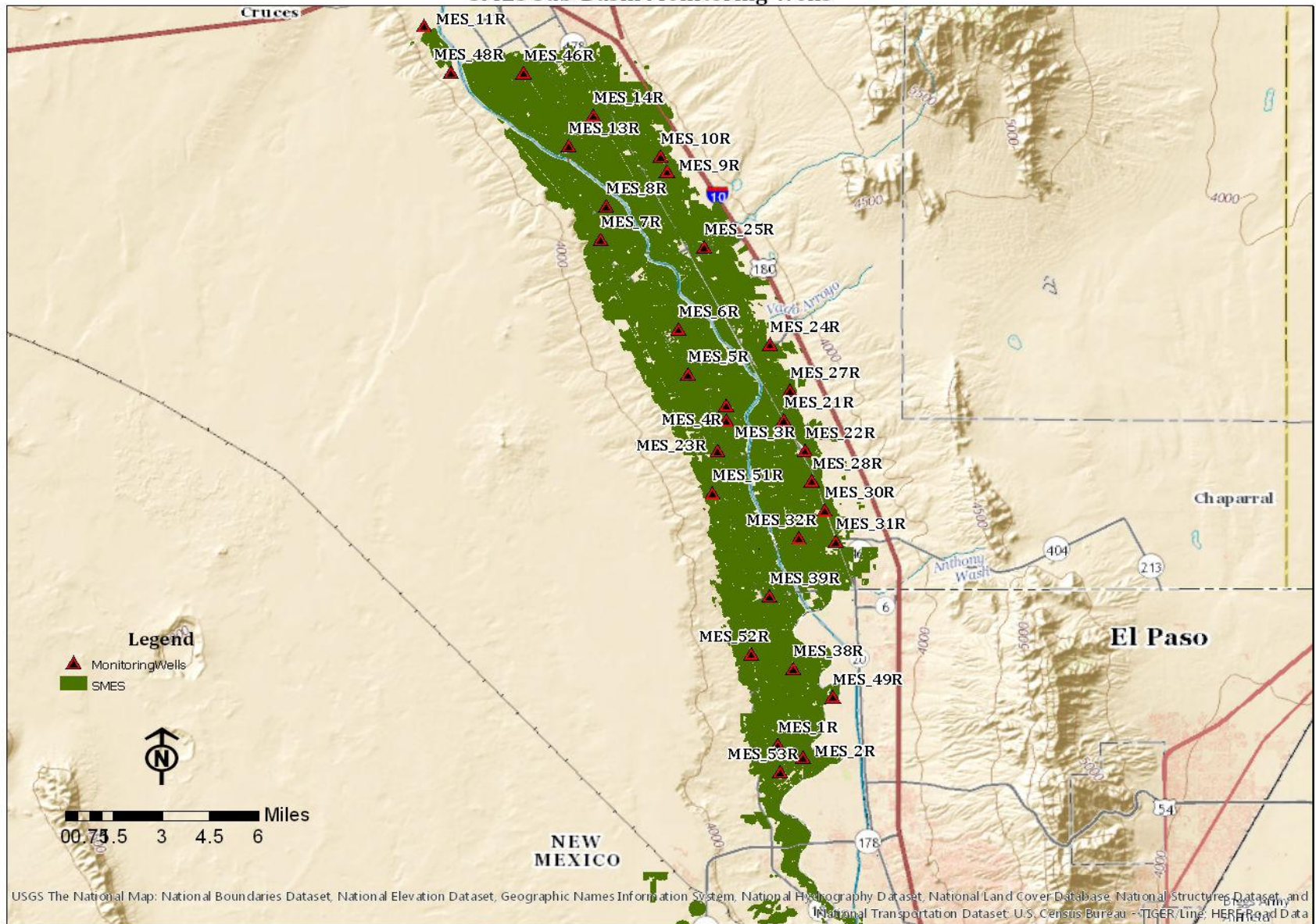


USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data

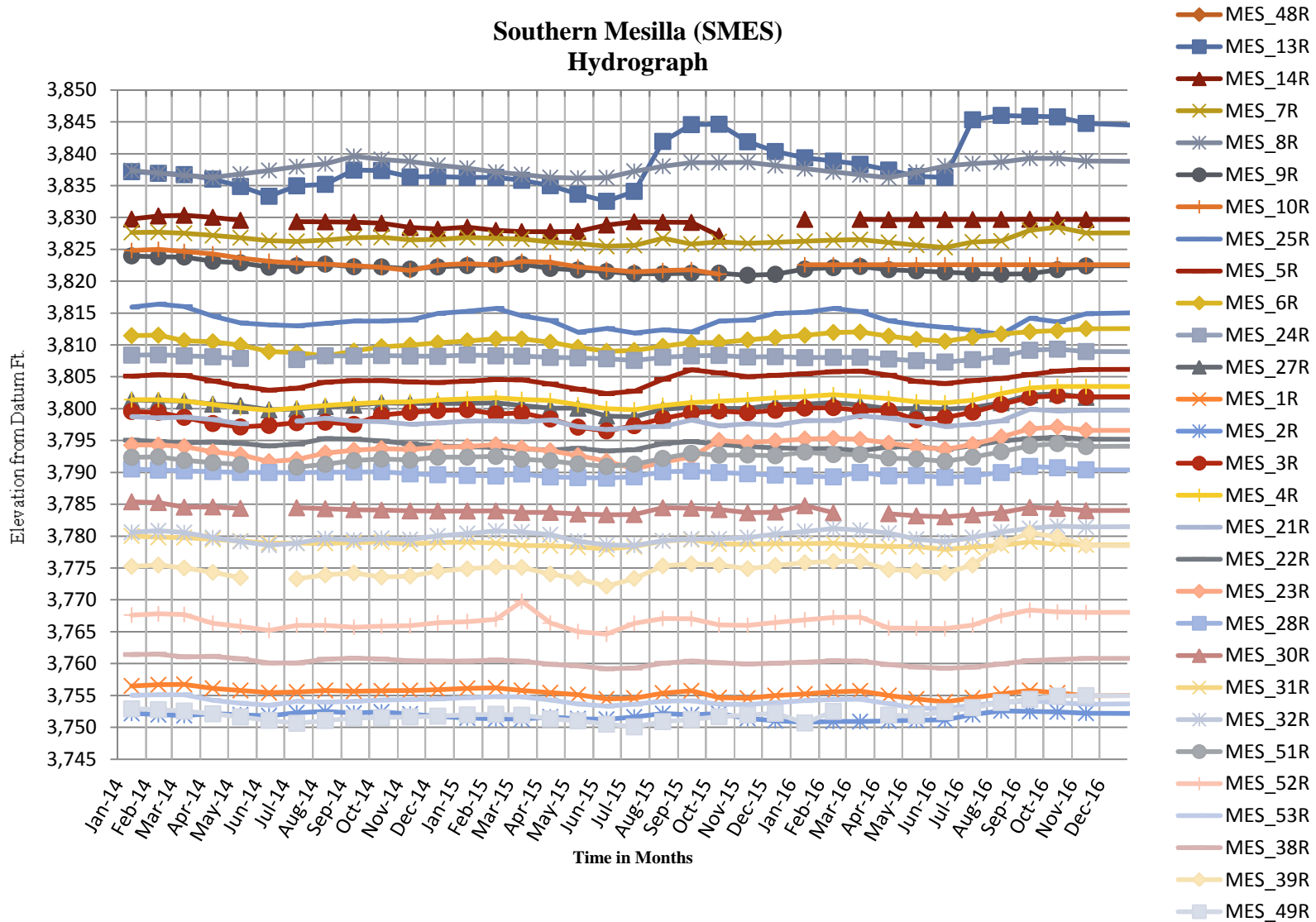
Northern Mesilla (NMES) Hydrograph



SMES Sub-Basin Monitoring Wells



Southern Mesilla (SMES) Hydrograph



2017 ACCOUNTING YEAR OUTLOOK

At the time of this report, the United States Department of Agriculture's (USDA), Natural Resource Conservation Service (NRCS) website for the Upper Rio Grande Basin watershed was reporting a basin wide snow water equivalent index number of 146% of normal, or 46% above average. Additionally, the NRCS monthly *New Mexico Basin Outlook Report* for February 2017 forecasts stream flow and runoff at San Marcial to be 161% of normal between March and July of 2017, which could translate to anywhere between 520,000 – 1,120,000 acre-ft of additional surface water potentially being available for allocation in the 2017 accounting year for the Rio Grande project (on top of usable water already in storage). If this forecast holds true, water users within the Lower Rio Grande Water Master district (particularly those with an irrigation purpose of use) can anticipate a respectable allotment of Rio Grande surface water via the Rio Grande project and the EBID during the 2017 irrigation season. Based on current available forecasts and in consideration of usable water in storage at Elephant Butte and Caballo Reservoirs, it can be anticipated that the allotment to EBID constituents could be anywhere between 12 - 24 acre-inches per acre (1.00 - 2.00 acre-ft per acre). With another consecutive year of increased amounts of surface water available to the system, it should be anticipated that ground water diversions for irrigation purposes will continue to decline consistent with the trend over the last three accounting years. All other uses not affected by available surface water supplies should be expected to maintain their observed three year averages, resulting in an anticipated total groundwater diversion in the 2017 accounting year of 250,000+ acre-feet

